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ABSTRACT

This strategic plan is a synthesis of a number of previous studies on computers in the schools of Alberta, Canada, as well as an assessment of the current situation in the schools, and a recognition of today's difficult fiscal climate. The topics covered include the rationale for integrating microcomputers into school programs; risks and constraints involved in computer use; uses of computers in Alberta's schools in the past and the current situation; strategic planning; educational software; curriculum and learning resources; teacher knowledge and development; computer hardware, networking, and facilities; planning and research; and funding. A concluding statement suggests that a redefinition of what computers should do in education and the gathering together of the necessary components--hardware, software, and teacher knowledge--be carried out to ensure an optimal return on the substantial investment in computers. A summary of departmental direction and actions for the near future concludes the report, and four appendixes provide additional materials from prior reports and conferences. (CGD)

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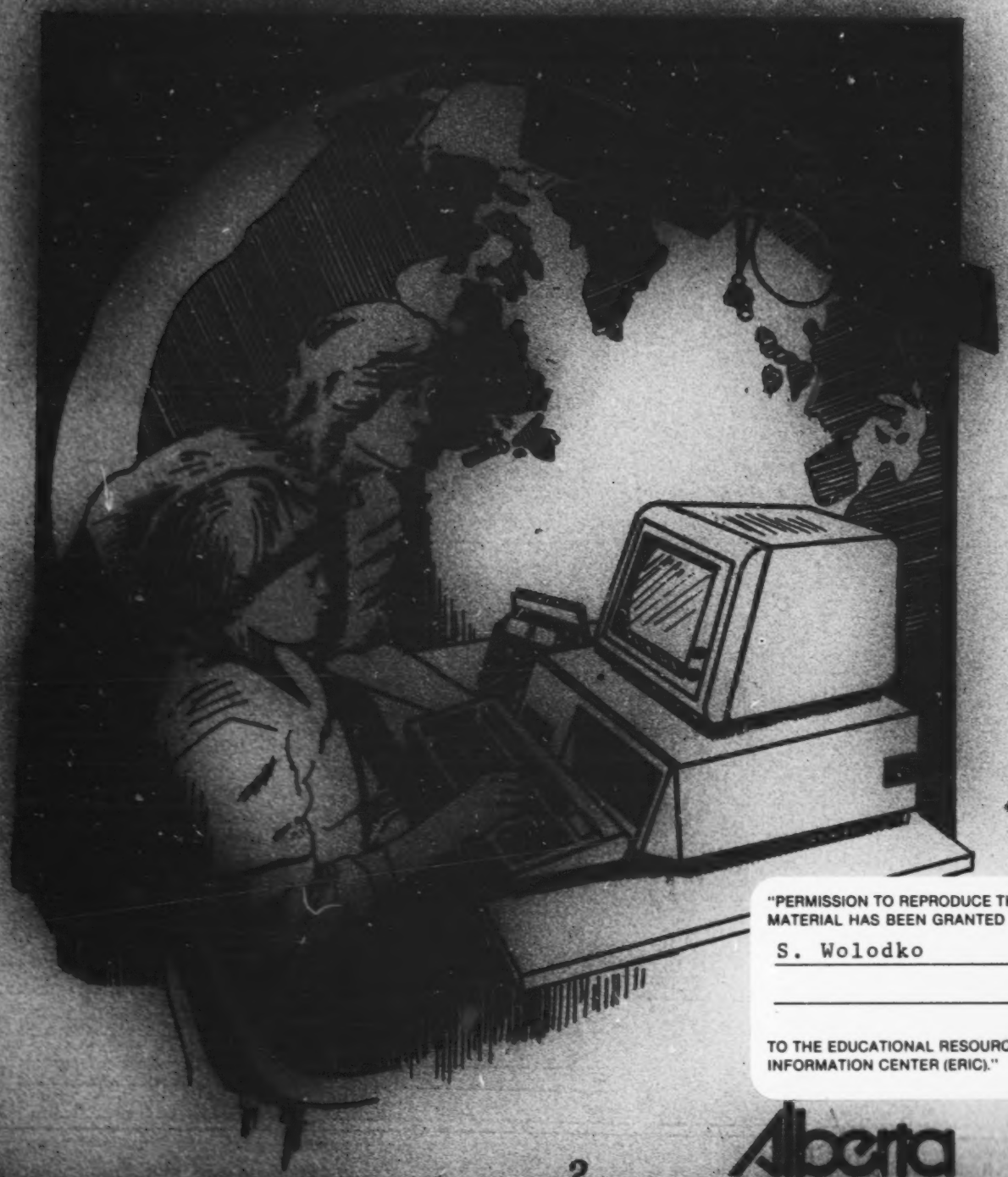
A Strategic Plan for MICROCOMPUTERS IN SCHOOLS



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A Strategic Plan for Microcomputers in Schools

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I. Title

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Foreword

As a result of initiatives such as the creation of the Computer Technology Project (1981), the Ministerial Task Force on Computers in Schools (1982/83), the Building Quality Restoration Program (BQRP) funding of microcomputer hardware (1983-86), and the Strategic Planning Symposium on Computers in Schools (1986), Alberta is recognized as a North American leader in educational computing. Alberta also ranks among the top jurisdictions in North America in terms of installed base and student computer ratios. In addition, as an early adopter of computers in schools, Alberta has a large base of teachers knowledgeable in educational computing.

Alberta ranks in the top educational jurisdictions in North America in terms of installed computers in schools

Future action must be cognizant of financial restraint. Therefore, the departmental direction must address the needs of the system, the limited resources available and the necessity of building on the existing base. In this way, educational computing can continue to evolve in Alberta even in challenging financial circumstances.

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I. Introduction

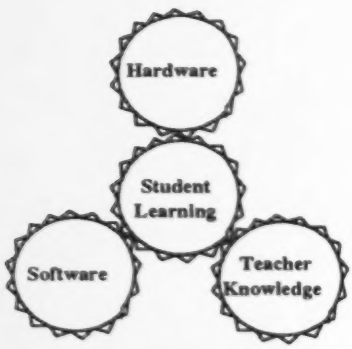
This **Strategic Plan for Microcomputers in Schools** is a **synthesis** of a number of previous studies on computers in Alberta's schools as well as an assessment of the current situation in the schools, and a recognition of today's difficult fiscal climate. Much of the early planning for computers in schools in Alberta occurred with the Ministerial Task Force on Computers in Schools and more recently in the Strategic Planning Symposium for Computers in Schools both of which contain many recommendations for action in educational computing. One other crucial contribution to the development of an educational computing plan is the work of Dr. Milton Petruk in the Microcomputers in Alberta Schools - 1986 survey which yields a clear picture of the current situation in Alberta with respect to computers in Alberta's schools.

educational computing is a rapidly evolving area

Educational computing is a rapidly evolving technology, making it difficult to comprehend and to ascertain the optimal direction for

a need to identify a strategic direction

future action. Yet the need to identify an appropriate strategic direction is crucial so that the potential of the current investment of more than $60 million in computers can be fully realized. While a careful selection of "rifle-shot" initiatives must bring maximum benefit or "best bang for the byte", it is also vitally important that a **sense of direction or vision** be established, for the computer can be used in a variety of ways that are not optimal in terms of the needs of students.



educational computing is a system involving hardware, software and teacher knowledge

A vital component of the effective implementation of educational computing, if it is to lead to improved student learning, is that it must be a **coordinated system**, involving a **vision** of what **should and can be done**, and the linkage of the necessary **components** to make the initiative work (i.e., hardware, software and teacher knowledge). Other educational innovations have not always been cognizant of this fact.

II. Rationale

A number of futurists contend that society progressed through three distinct phases before arriving at the present: the hunter and gatherer stage, the agrarian era, and the industrial phase. Present society is transforming into what is called the post-industrial or information society, wherein brainpower has replaced horsepower as the societal icon. For many people living in this era, there is an indistinct recognition that knowledge is power and that success depends on a person's ability to understand and manipulate information.

knowledge is power

The computer has become an inseparable part of the information transformation. Whereas the industrial age amplified the amount of work done by harnessing electrical and steam energy, the computer amplifies the intellect. Thus, it is believed that this intellectual tool will increase one's chance for success.

the computer amplifies the intellect

It was this belief that led to the placement of many computers into the schools in the early 1980's. Parents impressed by the success of this technology in the workplace

pressured for inclusion of the computer in the school. It then became the educator's lot to determine where the computer would best fit into the school curriculum. Computer literacy courses were developed with partial emphasis on programming, primarily because there was little computers could do without educational software.

the computer as a teaching tool

Another major response within education was to use the computer as a teaching device. This application was based on a relatively longstanding tradition, mainly in the university environment, to use the computer as an instructional tool. Unfortunately, because of limitations in the capability of the early microcomputers, lack of quality software and insufficient knowledge of how it might be best applied in a school context, use of the computer was often limited to drill and practice in the classroom.

Today, the situation has changed substantially. There is increasing recognition that the computer is an intellectual tool that

can amplify mental ability, and therefore have a direct bearing on the learning of children.

the need to reclarify the vision of educational computing

This is the crossroad at which Alberta Education finds itself today, with the need to refocus and redefine the vision of educational computing, and the need to put together the necessary components that will make the educational computing innovation work.

This is the rationale behind the need for leadership and a strategic direction for computers in schools.

III. Risks and Constraints

Much has been written concerning the risks associated with computers in schools. Will the acquired computers simply gather dust, like so many other innovations in education? Is there adequate software for the intended applications? Will the acquired computers be obsolete before the investment is realized? Do the teachers know how to use the computers or, even more important, do

teachers know how to **integrate the computer with their instruction in the classroom to improve the learning of their students?**

the need for ongoing assessments

The presence of the computer in the classroom is a new situation for education. Since there are no assured guidelines to follow, it is essential that accurate, ongoing assessments of educational computing be conducted and that a strategic direction, based on these assessments, be formulated on a continual basis. Only in this way can the investment in educational computing be optimized in schools and the risks minimized.

the need for recurrent strategic direction

a 63 million dollar investment in computers in schools

There is little question that fiscal constraint is a major dimension to any strategic plan on computers in schools in Alberta today. The province has come through a decade of resource-generated growth, which helped fuel many of the hardware acquisitions over the past three years. Having invested $63 million on computer hardware, some individuals might assert that other priorities

and needs must now take precedence. Others might contend that the heady days of rapid growth are over and now is the time for consolidation. Yet, Alberta has built an enormous base of both hardware and experience unparalleled in most other jurisdictions in North America. If new, effective directions can be determined, and frugally put in place, much more can be achieved with very few additional resources.

a new strategic direction frugally put in place

This is the leadership challenge that faces Alberta Education today.

IV. Background and Current Situation

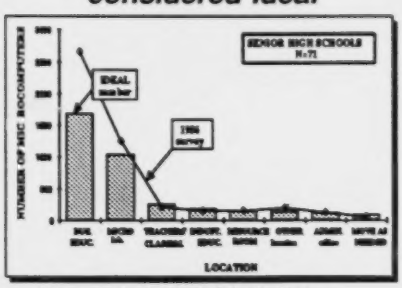
a Strategic Planning Symposium for Computers in Schools

On January 29 - 31, 1986, over 160 Alberta educators from several professional perspectives (e.g., teachers, school principals, superintendents, computer coordinators) were invited to plan for the future use of computers in schools. The product of their work was a comprehensive document that contained a number of recommendations for future action in educational computing.

Major recommendations from the Strategic Planning Symposium pertained to planning and leadership, funding, communications, learning resources, inservice and future events. Since this planning event, major changes have occurred in the international oil price and the subsequent fiscal uncertainty facing the province in 1987/88 and possibly beyond.

Also, in the intervening period, the department conducted a comprehensive survey of Microcomputers in Alberta Schools - 1986 (see Appendix A) which identified a number of areas requiring attention. A few of these areas are:

some areas have more computers than is considered ideal



Microcomputers in Alberta Schools - 1986

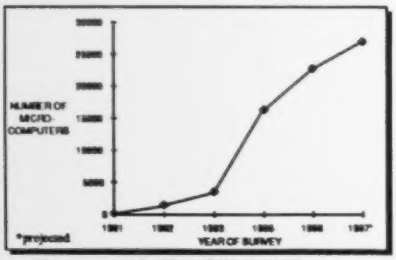
1. While, as a result of the BQRP initiative, business education in the high schools has more computers than is considered ideal by the principals surveyed, other areas in the high schools and other school levels require more access to computers.

procuring software at an affordable cost is a major problem

2. Procuring quality software at an affordable cost, to ensure effective use of the installed computer base, is a major problem area.

teachers need to integrate the computer with the curriculum and know how to use productivity software

3. Identified teacher needs in the schools have changed from initial awareness of computer capabilities to the need for effective integration of the computer into the school curriculum and the use of productivity software (e.g., word processors).



Microcomputers in Alberta Schools - 1986

there are 27,000 computers in schools

4. As of January 1, 1986, there were 22,752 microcomputers in Alberta's schools, or 1 computer for every 20.3 students. Today, there are approximately 27,000 microcomputers in schools, or **1 computer for every 17.1 students**.

5. Hardware acquisition, which was meteoric over the past three years, appears to be levelling off.

over 3/4 of the schools have a "computer coordinator"

6. Microcomputers in Alberta Schools - 1986 reveals that 77.2% of Alberta's schools have a designated computer coordinator, with 71.9% of schools having at least one teacher making extensive use of computers.

a plan to optimize the return on the financial investment

These figures indicate that Alberta is in a favourable position with respect to educational computing. First, a **very significant hardware base** has been established. Second, a large **base of expertise** in educational computing has developed over the past few years.

However, what is now required is the marshalling of these existing resources in directions which will optimize the return on this substantial educational investment, and help in shaping the future.

V. Strategic Planning

the need to establish a direction of what should be done

One of the most important aspects of a strategic plan in educational computing is the development of a **sense of direction** of what should be done. In this quest, careful attention must be paid to the difference between what can be done and what needs to be done. Activities in the past few years have shown that, while learning about the computer may have been appropriate in the early stages of educational computing, continued focus on computer literacy, in the programming dimension, is highly questionable. There is little doubt that computer programming for all students can be done, yet few educators today would advocate much emphasis on programming beyond some Logo experiences in the elementary schools and perhaps advanced work in computer science classes.

The question of what should be done relates more to what the computer can do to facilitate the student's learning needs, than it does to, what can we do with these computers?

Consideration of a proposed strategic direction must rest on a number of basic premises. These are:

educational computing is more than a set of courses

1. Educational computing is more than a set of courses that students may take; it is part of the developmental learning process throughout a student's schooling experiences. Also, the use of the computer in schools will be seen increasingly as a tool to improve the effectiveness and/or efficiency of learning and teaching and therefore crossing many curricular boundaries.

the computer must be integrated with the curriculum in need areas and integrated with instruction through support materials

2. The computer will have maximum effect if it is integrated into the curriculum in areas of identified need, and integrated with instruction through the provision of student and teacher support materials.

3. The success of the integration of the computer into the classroom rests largely with the teacher. This implies recognition of the new knowledge, skills and understandings required by the teacher to use this new tool effectively to improve the learning of

students. It implies also that there must be access to the appropriate curricular materials and software.

4. Initiatives in the area should involve **cooperation** among the department, school jurisdictions, schools, teachers and students.

ongoing planning will be required

5. Short- and long-term educational computing plans will be required if the initiative is to achieve optimum success.

the computer is an intellectual assistant

Education must recognize the computer's success as an information device in other areas of endeavour in society; that is, the use of the computer as an intellectual aid in the acquisition, organization, manipulation, and dissemination of information.

the computer as a writing skills development tool

A good example of this sense of direction is the use of the computer as a word processing device to complement the writing skills of students. The advantage of using the word processor over traditional writing approaches is that the students can easily and dynamically modify compositions and, under

the skillful direction of a teacher, thereby improve their writing products.

the computer as a learning tool

The use of the computer as a tool is not limited to these applications. A genetics simulator allows a student to explore laws of genetics over many generations of individuals. Science classes can use spreadsheets and other simulations; music classes can use compositional software; art classes can use graphics software, and design classes can use Computer Aided Design (CAD) software.

the computer as a teaching tool

A teacher can also use the computer as a teaching tool to individualize exercises for students, or with high quality software, as a powerful, dynamic instructional device to convey difficult concepts. What is critical in these approaches is that the teacher must not only have the skills required to use the computing tool, but must at the same time be able to integrate this tool in the classroom to achieve the goals and objectives of the curriculum. *This is the meaning of integration of the computer with instruction.*

the computer is a general purpose tool crossing many curricular boundaries

the computer is a school resource

These applications also imply a reclarification of perspective: that educational computing is not a course in computing or the use of computers in a specific curricular area, but that the computer is a general purpose learning and teaching tool, made specific through the use of software. Used in this way, the computer would benefit most students in the schools, not just those within specific programs. This direction, though, necessitates a shift in focus: that the computer is seen as a school resource available to all students and teachers and not limited to a specific curricular area.

Policy Direction

In the future, the primary use of computers in schools will be as integrated learning and teaching tools used throughout a student's school experiences.

In times of restraint, it is also necessary that the department concentrate its activities in those areas which have high impact. In order to use the established

hardware base in the province to the best advantage, a focus of departmental activities over the next two to three years will be on the integration of computers in schools in areas of identified need.

Departmental Action

Over the next two to three years, Alberta Education will concentrate on the integration of computers with instruction and the curriculum, through the use of educational applications in identified need areas.

VI. Educational Software

Background

The computer without software is like a body without a soul. Recognition of this fact prompted the Computer Technology Project (1981) to establish a Software Clearinghouse to evaluate software for Apple computers in the province's schools. This work, to date, has resulted in the approval of approximately 200 products, mostly at the supplementary learning resource level.

Over the past year, the department also conducted the evaluation of productivity software (e.g., word processors, data bases, spreadsheets, and integrated packages) on a **cost-performance basis**. Using this approach, based on the large inventory of computers now in Alberta's schools, it has been possible to obtain significant discounts on acquired software packages.

Microcomputers in Alberta Schools - 1986

Microcomputers in Alberta Schools - 1986 reported the following with respect to software:

a. Of the schools using computers for administrative purposes, 96.9% are using word processing software.

b. The bulk of the administrative packages used by schools are:

- -Integrated software (27.2%)
- -Word processing software (41.7%)
- -Spreadsheet software (21.3%)
- -Data base management software (21.6%)
- -Grade/attendance software (19.3%)

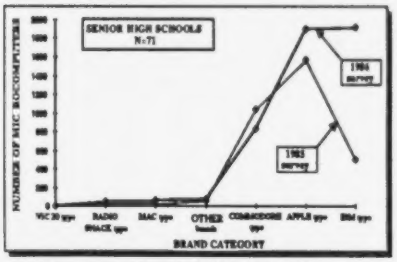
c. Those areas showing the greatest difference between what should be used and what is used for administrative applications are:

	Should Be Used	IsUsed
Communications software	21.6%	8.8%
School scheduling	19.2%	6.7%
Grade attendance/reporting	30.3%	19.0%
School accounting	30.4%	14.3%
School timetabling	23.9%	8.0%

over 80% of the school principals indicated procuring software was an important issue

d. Procuring and maintaining software was reported as a high or medium level of importance issue by 81.8% of the respondents.

e. Of significance to software evaluation decisions, 39.3% of the computers in the high schools are Apple type and 39.6% are IBM type. Furthermore, 76.7% of intended purchases in 1986/87 in the high schools are IBM type.



Microcomputers ins Alberta Schools - 1986

Departmental Direction

Educational Software Evaluation, Acquisition and Distribution

Microcomputers in Alberta Schools - 1986 leaves little doubt that software availability is a major problem area in the province. In part, this is a result of the BQRP initiative focusing on the acquisition of hardware, but not supporting the acquisition of software. From the success of the Productivity Software Project in perceiving Alberta's 27,000 computers as a market and negotiating significant cost discounts, it is apparent that similar strategies can be used for future software acquisition activities. It is also apparent that a focus of future software acquisition activities should be on **licensing** a number of powerful software tools for use on the established hardware base.

with 27,000 computers, Alberta is a software market and can negotiate discounts

provincial software licenses can be acquired

Since provincial licensing is a relatively new area, it is necessary to determine the components of an effective license. For

example, the duration of the license, the distribution mechanism, access to updates, etc., must all be addressed to ensure a cost-effective approach.

Departmental Action

That a "task group" of recognized experts in education in the province be formed to draft the terms of reference of future licensing arrangements, and to propose a mechanism for implementing the task groups recommendations.

a Policy on Educational Software

On the basis of the recommendations received from the above task-group, the department will proceed to develop a **Policy on Educational Software**. A basic principle of this policy will be to determine areas of curricular need and to maximize the potential impact of computer technology on the learning of the students of this province.

Departmental Action

That Alberta Education establish a policy position and funding for the annual acquisition of software for computers in schools. Included in this policy will be the provision for the provincial licensing of software in identified need areas.

the identification of curricular needs which have technological potential

The identification of curricular need areas that have technological potential is extremely important to the success of the above policy direction. It is recommended that a committee on computers in schools, composed of respected educators who are knowledgeable about educational computing, and who represent the various partners in the educational enterprise in Alberta, be established to assist in the identification of curricular needs and technological solutions.

Departmental Action

A committee on computers in schools, composed of representatives of the major educational interest groups will be established to provide recommendations on identified educational software solutions in identified curricular need areas.

It is clear that, given the current fiscal climate in the province, evaluation and selection of materials must be delimited. Consistent with the mandatory recommendations of the Elementary Computer Literacy discussion paper, the future evaluation and selection of computer software materials will be delimited to identified areas of need.

Departmental Action

That further evaluation of software learning materials delimit its focus to those areas which have been identified by Alberta Education as high need areas. Additionally, cost/educational benefits should be included in the selection criteria for provincial authorization. Also, where possible, the student exercises and teacher guides associated with the selected software packages should be acquired/developed to assist teachers in integrating the computer with instruction.

There may be a number of important high need areas which cannot be addressed with commercially available software. Alberta Education, in cooperation with other government departments, may encourage the creation of an Alberta based software development industry to address these needs.

Microcomputers in Alberta Schools - 1986 also reveals that there are now equal numbers of both Apple and IBM type computers in the high schools (approximately 40% of each), with IBM having the edge in intended purchases (76.7%) by high schools in 1986.

Departmental Action

That Alberta Education extend its policy of evaluating Apple and IBM type courseware materials to further evaluations for the high school sector in either IBM or Apple type and that educational need, licensing and cost-performance become major factors in making selection decisions.

VII. Curriculum and Learning Resources

Background

In 1983, the department released computer literacy curricula in the elementary, junior high and senior high levels. In the same period, Computer Processing 10, 20, and 30 was introduced in the high schools.

Microcomputers in Alberta Schools - 1986

Microcomputers in Alberta Schools - 1986 indicates the following with respect to curriculum issues:

a. Respondents reported that, ideally greater emphasis should be placed on teaching keyboarding.

b. 67.1% of the schools felt that most teachers needed additional training in integrating computers into the curriculum.

use of the computer as a tool to enhance student writing

One of the areas of identified need and high potential impact on education is the use of the word processor to enhance the writing skills of students. The ability to manipulate text easily and quickly on a word processor offers the opportunity to use the computer to improve writing skills. Additional packages such as spelling and grammar checkers and a thesaurus can be integrated into the

instructional program, thereby giving the student access to powerful writing tools.

Departmental Action

That Alberta Education undertake a major initiative entitled, Writing Skills Development Using a Word Processor. The project will acquire/ develop student materials and teacher guides concerning the use of the word processor as a tool to complement writing skills. In addition, the project will obtain a provincial licence of word processing software to include in the package of materials.

One element of focus in the computer literacy program was an emphasis on BASIC programming skills. While this emphasis was appropriate at the time of initial computer literacy development, the situation today is substantially changed. With the development of high quality application software for microcomputers, the opportunity exists to articulate the computer literacy program with the use of computers in other curricular areas. This approach perceives computer

literacy as a means of integrating computers into other curricular areas and that following successful integration, the computer literacy curriculum may be discontinued.

Departmental Action

That the future focus of computer literacy activities be toward integration of the computer into the regular programs of studies.

VIII. Teacher Knowledge and Development

Background

In the early stages of the Computer Technology Project, Alberta Education established a coordinator position to assist school jurisdictions in the inservicing of teachers in the province. Also, in the past few years a Teacher Inservice Grant to the school jurisdictions contributed to the development of computer awareness of many teachers in Alberta. The Teacher Inservice Grant was discontinued in 1987/88.

Microcomputers in Alberta Schools - 1986

Microcomputers in Alberta Schools - 1986 indicates the following with respect to this area:

a. 77.2% of all schools have identified a computer coordinator.

b. 71.9% of all schools have at least one teacher making extensive use of computers.

c. Of 24,026 teachers 2,388 (9.9%) were identified as extensive users of computers for instruction.

d. Only 4.8% of the teachers in the high schools, in contrast to 11.7% of elementary teachers, are extensive users of computers.

e. The majority of teachers were trained either in school workshops (most teachers 44.2%, some teachers - 37.4%) or district-sponsored workshops (most teachers - 21.6%, some teachers - 60.2%).

the greatest teacher needs were integration of the computer with the curriculum and using productivity software

f. The greatest needs for additional training were in the use of productivity software (most teachers - 51.5%, some teachers - 33.3%) and in the integration of computers in the curriculum (most teachers - 67.1%, some teachers - 22.6%).

Departmental Direction

A. Preservice and Graduate Teacher Education

There is general agreement that preservice and graduate education should include experiences that lead to knowledge and skills with respect to educational computing. Since the mandate for this area resides with the Faculties of Education in Alberta's three universities, it is proposed:

Departmental Action

That departmental officials meet with representatives of the faculties of education to discuss preservice and graduate teacher education issues in educational computing.

B. Inservice Teacher Education and Support

Teacher inservice and support is an area that can consume vast amounts of resources. To take advantage of the "computer coordinator" resources that exist within the province, an inservice model that "cascades" the

information to these individuals who then inservice staff in their jurisdictions is a cost-effective way in reaching many of the teachers in the province.

Departmental Action

That a leadership inservice workshop be conducted with identified lead teachers to provide inservice opportunities in areas of identified need. The focus of the leadership workshops in 1987/88 will be on the inservicing of the Writing Skills Development Using a Word Processor project previously identified. Sponsorship for these inservice sessions may include support from Alberta Education, ATA, the school jurisdictions, and possibly the computer companies.

IX. Computer Hardware, Networking, and Facilities

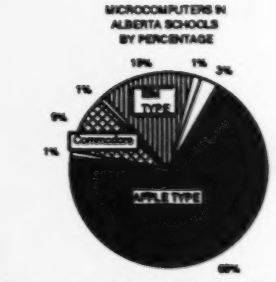
Background

Alberta's schools have 27,000 computers

Over the past three years, Alberta schools have experienced rapid growth in computer hardware. In March 1983 there were 3,535 computers or about one computer for every 120 students. The BQRP $31.5 million matching grant has fundamentally changed the computer hardware situation in the province. Today, the province has approximately 27,000 microcomputers, an overall 17.1 ratio of students to computers, and ranks in the top jurisdictions in North America with respect to the installed base in computers in schools (see Appendix B).

Microcomputers in Alberta Schools -1986

Microcomputers in Alberta Schools - 1986 indicates a number of highlights relating to hardware:



Microcomputers in Alberta Schools - 1986

a. Effective January 1, 1986, there were 22,751 computers in schools, an increase of 39.4% (6,427) over 1985.

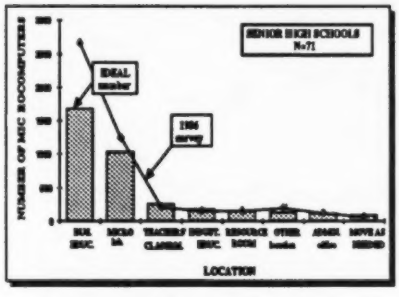
b. Apple type computers account for 69.3% of the market and IBM type account for 15.2% of the market.

c. Estimated purchases for 1986 were 4,203 microcomputers, somewhat below the 6,427 purchased in 1985. If the intended purchases are realized, the number of computers in Alberta's schools by December 31, 1986 is projected to be 26,955.

d. Of the intended purchases, 37.4% are of IBM type computers. In the high schools, 76.7% of the intended acquisitions in 1986 will be IBM type.

Many of the educational computers are in classroom sets

e. Over 60% of the computers are in classroom sets or computer laboratory situations, yet most computers remain as stand-alone configurations.



Microcomputers in Alberta Schools - 1986

f. Projections for 1986 indicate that 34.6% of the computers will be allocated to business education labs and 31.5% to microcomputer labs. Yet, respondents indicate that ideally 45.7% should be in microcomputer labs and 14.6% in business education labs. Furthermore, by the end of 1986, it is estimated that business education labs will

have 5,794 computers, yet the respondents felt that the ideal number was 3,343.

g. As of January 1, 1986 the number of students per computer in the high schools is 13:1.

h. The average number of computers per high school is 68.2.

Departmental Direction

Microcomputers in Alberta Schools - 1986 also shows a residual base of 2,400 Commodore and Vic20 type computers which are of little further use in the schools. These computers will need to be replaced with either Apple or IBM type machines. In addition, over the long-term, the existing base of Apple type computers will require upgrading to take advantage of new software developments.

Departmental Action

Following the completion of the BQRP grant for computer acquisition and the difficult financial climate, it is not now possible to establish a maintenance/upgrading fund for computer equipment. It must be noted, though, that computer equipment ages and wears out. In addition, updating of equipment will be required to take advantage of enhanced software. It will be necessary to increase the "lifetime" of the equipment and, when possible, a maintenance/upgrading fund may need to be established.

some areas of education are supersaturated with computers while others have little or no access

The results of the Microcomputers in Alberta Schools - 1986 report indicate that Alberta ranks near the top in student/computer ratios in North America (see Appendices A and B). The results also reveal that while business education in the high schools is supersaturated with computers, other subject areas have little or no access, which probably is the reason only 4.8% of high school teachers are extensive users. These facts strongly indicate that a new direction is required: to view the computer not as a

specific curricular resource, but as a school resource.

Departmental Action

In order to ensure that all students have equal access to computers in schools, Alberta Education will establish a policy position that the computer is a school resource and that the jurisdictions be encouraged to plan for the most effective placement of computers in their schools.

X. Planning and Research

Departmental Planning Direction

A cursory glance at educational computing supports the view that considerable change has occurred in this field over the past five years. In fact, computers in schools in Alberta have grown a hundred times over this period. To ensure that strategic planning along with the components of hardware, software and teacher knowledge are addressed over a longer period (three to five years), an ongoing planning mechanism should be established. One approach is to establish a committee on computers in schools, composed of respected educators who are

knowledgeable of educational computing and who represent the various partners in the educational enterprise in Alberta.

Departmental Action

In the three to five year perspective, it can be expected that computers in schools will continue to experience rapid change and development. To allow Alberta Education to plan effectively and take maximum advantage of these ongoing developments, the committee on computers in schools previously identified as having responsibility for provincial software licensing will be expected to assist in planning for the future use of this technology.

Departmental Research Direction

While traditional research may be necessary, the situation today in schools also requires that initiatives be undertaken that provide direction to the educational system, of what is possible. Support for innovations is needed which, if successful, can provide a

"zone of acceptability" and thereby a nucleus for further implementation.

Departmental Action

That Alberta Education will consider the use of departmental research funds for educational computing in identified high need areas.

XI. Funding

Background

The establishment of the $31.5 million matching grant to schools for computer hardware acquisition has substantially contributed to the current ratio of students per computer. As well, the department provided a Learning Resources Grant of $10/pupil in 1985, some of which could be used for software acquisition.

Departmental Response

Any additional requests for funding must be scrutinized carefully. Hardware support, without significant software support, has created an imbalance in the educational computing initiative. In addition, upgrading and maintenance of the existing hardware base will be required if the useful life of the

existing educational computers is to be increased.

Departmental Action

Alberta Education recognizes the need for support in the area of software acquisition in identified need areas and the teacher support necessary for the integration of computers with instruction. In addition, when funding becomes available, there will be a need to establish a program for the ongoing upgrading and maintenance of computers in schools.

XII. Conclusion

There is little doubt that a period of rapid growth in computer hardware in schools is coming to an end and, in the next few years, educational computing in Alberta will focus on the consolidation of this resource in the schools. A very significant base of hardware and educational computing expertise has been established which provides the province with a window of opportunity. A "vision" of the computer as an intellectual amplifier, which

the need for a reclarified vision of educational computing and the necessary components to make educational computing a success

can be used as a learning and teaching tool in the classroom is proposed. Such a vision encompasses the philosophy that educational computing is not specific to any one curricular area but is a learning tool used throughout a student's experiences. To realize optimum return of the substantial investment in computers, it is proposed there be a redefinition of what computers should do in education and the gathering together of the necessary components -- hardware, software and teacher knowledge -- to ensure the success of this important educational tool.

XIII. SUMMARY OF DEPARTMENTAL DIRECTION AND ACTIONS

STRATEGIC PLANNING

In the future, the primary use of computers in schools will be as integrated learning and teaching tools used throughout a student's school experiences.

Over the next two to three years, Alberta Education will concentrate on the integration of computers with instruction and the curriculum, through the use of educational applications in identified need areas.

EDUCATIONAL SOFTWARE

That a "task group" of recognized experts in education in the province be formed to draft the terms of reference of future licensing, arrangements and to propose a mechanism for implementing the task group's recommendations.

That Alberta Education establish a policy position and funding for the annual acquisition of software for computers in schools. Included in this policy will be the provision for the provincial licensing of software in identified need areas.

A committee on computers in schools, composed of representatives of the major educational interest groups will be established to provide recommendations on identified educational software solutions in identified curricular need areas.

That further evaluation of software learning materials delimit its focus to those areas which have been identified by Alberta Education as high need areas. Additionally, cost/educational benefits should be included in the selection criteria for provincial authorization. Also, where possible, the student exercises and teacher guides associated with the selected software packages should be acquired/developed to assist teachers in integrating the computer with instruction.

That Alberta Education extend its policy of evaluating Apple and IBM type courseware materials to further evaluations for the high school sector in either IBM or Apple type and that educational need, licensing and cost-performance become major factors in making selection decisions.

CURRICULUM AND LEARNING RESOURCES

That Alberta Education undertake a major initiative entitled, Writing Skills Development Using a Word Processor. The project will acquire/develop student materials and teacher guides concerning the use of the word processor as a tool to complement writing skills. In addition, the project will obtain a provincial licence of word processing software to include in the package of materials.

That the future focus of computer literacy activities be toward integration of the computer into the regular programs of studies.

TEACHER KNOWLEDGE AND DEVELOPMENT

That departmental officials meet with representatives of the faculties of education to discuss preservice and graduate teacher education issues in educational computing.

That a leadership inservice workshop be conducted with identified lead teachers to provide inservice opportunities in areas of identified need. The focus of the leadership workshops in 1987/88 will be on the inservicing of the Writing Skills Development Using a Word Processor project previously identified. Sponsorship for these inservice sessions may include support from Alberta Education, the ATA, school jurisdictions, and possibly the computer companies.

COMPUTER HARDWARE, NETWORKING, AND FACILITIES

Following the completion of the BQRP grant for computer acquisition and the difficult financial climate, it is not now possible to establish a maintenance/upgrading fund for computer equipment. It must be noted, though, that computer equipment ages and wears out. In addition, updating of equipment will be required to take advantage of

enhanced software. It will be necessary to increase the "lifetime" of the equipment and, when possible, a maintenance/upgrading fund may need to be established.

In order to ensure that all students have equal access to computers in schools, Alberta Education will establish a policy position that the computer is a school resource and that the jurisdictions be encouraged to plan for the most effective placement of computers in their schools.

PLANNING AND RESEARCH

In the three to five year perspective, it can be expected that computers in schools will continue to experience rapid change and development. To allow Alberta Education to plan effectively and take maximum advantage of these ongoing developments, the committee on computers in schools previously identified as having responsibility for provincial software licensing, will be expected to assist in the planning for the future use of this technology.

That Alberta Education will consider the use of departmental research funds for educational computing in identified high need areas.

FUNDING

Alberta Education recognizes the need for support in the area of software acquisition in identified need areas and the teacher support necessary for the integration of computers with instruction. In addition, when funding becomes available, there will be a need to establish a program for the ongoing upgrading and maintenance of computers in schools.

APPENDIX A

Executive Summary

Microcomputers in Alberta Schools - 1986

Early in 1986, the principals of all schools in Alberta were asked to complete a survey which requested information about the nature and extent to which microcomputers were being used in the schools. A total of 1,345 out of the 1,489 surveys (90.3%) were completed. Following are the major findings resulting from this survey:

* On January 1, 1986, the total number of microcomputers in the 1,345 Alberta schools surveyed was 20,551. Based on these findings, it is estimated that the total number of microcomputers in all 1,489 Alberta schools is 22,752. This is an increase of 6,428 over the estimated number of microcomputers reported on January 1, 1985.

* It is estimated that in 1986, the 1,345 schools surveyed will purchase 3,797 additional microcomputers. This would bring the total number of microcomputers in the 1,345 schools surveyed to 24,348 by January 1, 1987. Based on these findings, it is estimated that the total number of microcomputers in all 1,489 Alberta schools will be 26,955 by January 1, 1986.

* Based on the results of this survey, it is estimated that the ideal number of microcomputers needed in all 1,489 Alberta schools is 36,783.

* The ratio of students to microcomputers in Alberta schools on January 1, 1986 was 20.3:1. The estimated ratio of students to microcomputers on January 1, 1987 is 17.1:1.

* The largest proportion of microcomputers in Alberta schools is APPLE type (69.3%). This proportion is slightly lower than that reported one year ago (72.0%). The second largest proportion of microcomputers in Alberta schools is IBM type (15.2%). This proportion is considerably higher than that reported one year ago (6.3%).

* During 1986, schools anticipate that only 54.9% of the microcomputers they purchase will be APPLE type while 37.4% will be IBM type. Yet schools report that ideally, 76.6% of the microcomputers should be APPLE type and only 15.0% should be IBM type.

* The largest proportion of microcomputers in Alberta schools is located in microcomputer laboratories (42.7%) while the second largest proportion (21.8%) is located in business education classrooms.

* During 1986, schools anticipate that only 31.5% of the microcomputers they purchase will be allocated to microcomputer laboratories while 34.6% will be allocated to business education classrooms. Yet schools report that ideally, 42.0% of the microcomputers should be allocated to microcomputer laboratories while only 13.4% should be allocated to business education classrooms.

* Most schools (77.2%) have designated an individual in the school as the "computer coordinator". Junior high schools have the highest proportion of schools (88.6%) in which an individual has been designated as the "computer coordinator".

* Most schools (71.9%) reported at least one teacher, who, in the opinion of the respondent, was an "extensive user" of microcomputers in the classroom. The findings indicated that 9.9% of all teachers in Alberta schools are considered to be "extensive users" of microcomputers in the classroom. The largest proportion of teachers who are considered to be "extensive users" of microcomputers is in elementary schools (11.8%) while the smallest proportion is in high schools (4.8%).

* Only 8.9% of the schools reported having microcomputers that were specially equipped to generate French characters. It is estimated that an additional 6.3% of the schools will purchase special equipment to permit microcomputers in their schools to generate French characters during 1986. Respondents reported that ideally, 21.5% of the schools should have microcomputers that are specially equipped to generate French characters.

* Only 3.3% of the schools reported having microcomputers that were specially equipped for use by physically disadvantaged students. It is estimated that an additional 0.7% of the schools will purchase special equipment to permit microcomputers in their schools to be used by physically disadvantaged students. Respondents reported that ideally, 16.7% of the schools should have microcomputers that are specially equipped for use by physically disadvantaged students.

* Only 6.2% of the schools reported that students had no access to microcomputers outside of class time. Only 1.3% of the schools reported that teachers had no access to microcomputers outside of class time.

* Respondents generally reported that ideally, a greater emphasis should be placed on teaching "keyboarding".

* Schools are just beginning to use microcomputers for administrative purposes with 41.7% of the schools reporting that they were using word processing software and 27.2% reporting that they were using integrated software.

* Respondents reported that **most** of the teachers in their schools received training in the use of microcomputers from school workshops (44.2%), district-sponsored workshops (21.6%) and from self-teaching (11.7%).

* Very few schools reported that **most** of the teachers in their schools received training in the use of microcomputers as a result of one university or college course (1.9%), two university or college courses (0.5%) or three or more university or college courses (0.2%).

* Respondents reported that **most** of the teachers in their schools needed additional training in *integrating microcomputers into the curriculum* (67.1%)), *using productivity software* (51.1%), *introductory computer literacy* (23.8%) and *computer programming* (18.4%).

* The single problem which 55.8% of the respondents identified to be of **high** importance was *procuring and maintaining software*.

APPENDIX B

Microcomputers in Schools in Canada and the U.S.A.

STATE/PROVINCE	TOTAL MICROS	APPLE	IBM	RATIO
Alaska	7,000	90%		14:1
Connecticut	30,000	60%	20%	16:1
Wyoming	6,300	83%	3%	16:1
Alberta	27,000	67.1%	18.6%	17.1:1
Minnesota	33,000	90%	8%	21:1
Montana	7,000	62%	5%	22:1
South Dakota	5,000	45%	4%	25:1
Manitoba	8,000	30%		26:1
Iowa	18,770	79%	6.8%	29:1
New York	90,000	46%	8%	29:1
Oregon	15,000	56.8%	4.5%	29:1
Arkansas	14,000	25%	2%	30:1
Colorado	N/A	96%		30:1
Kansas	12,000	70%	5%	30:1
Florida[3]	48,873	43.6%	7.7%	32:1
Rhode Island	3,900	45%	1%	33:1
Tennessee[10]	N/A	85%		33:1
Arizona[1]	21,215	46%	5%	35:1
Delaware	2,903	93%	5%	35:1
Maine	6,000	38%	2%	35:1
Kentucky	17,000	49%	10%	38:1
Alabama	19,000	75%	9%	39:1
North Carolina	28,000	42%	17%	39:1
Pennsylvania[8]	50,000	50%	15%	40:1
South Carolina[9]	14,959	58%	9%	40:1
British Columbia	12,000	65%		42:1
Ontario	55,000(est)	30%(est)		42:1(est)
Indiana[4]	23,124	49%	8%	43:1
Nebraska[7]	6,000	30%	21%	43:1
Idaho	45,000	44%	5%	44:1

STATE/PROVINCE	TOTAL MICROS	APPLE	IBM	RATIO
Washington D.C.	2,100		40%	45:1
Missouri[6]	18,000	54%	12%	45:1
Ohio	40,000	60%	3%	45:1
Nevada	3,513	91.3%		46:1
New Jersey	40,000	52%	10%	47:1
Vermont	2,000	50%	10%	47:1
Quebec	25,000	12%	32%	48:1
Washington	15,130	43%	6%	49:1
Utah	8,000	60%	10%	50:1
New Brunswick	2,400		30%	52:1
Nova Scotia	3,300	50%		53:1
Texas	54,300	N/A	N/A	54:1
PEI	400			62:1
Hawaii	2,500	80%	8%	70:1
Saskatchewan	2,100	50%	5%	71:1
Mississippi	6,000	25%	15%	85:1
Maryland	7,043	40%	14%	95:1
Georgia	8,000	65%	10%	135:1
Newfoundland	850			176:1
California[2]	115,000	70%	8%	N/A
Illinois	N/A	N/A	N/A	N/A
Louisiana	12,717	33%	8%	N/A
Massachusetts[5]	21,075	N/A	N/A	N/A
Michigan	N/A	N/A	N/A	N/A
New Hampshire	N/A	N/A	N/A	N/A
New Mexico	N/A	N/A	N/A	N/A
North Dakota	N/A	75%	5%	N/A
Oklahoma	N/A	N/A	N/A	N/A
Virginia	12,000	35%		N/A
West Virginia	N/A	N/A	N/A	N/A
Wisconsin	N/A	80%	5%	N/A

U.S. Jurisdictions - Electronic Learning, October 1986
[1]Arizona: The number reflects microcomputers for instructional purposes only; it does not include computers for administrative purposes. [2]California: Data as of November 1985. [3]Florida: As of October 1985. [4]Indiana: As of 1984/85 school year. [5]Massachusetts: As of Spring 1985. [6]Missouri: As of Fall 1985. [7]Nebraska: As of Spring 1984. [8]Pennsylvania: Includes Tandy 1000. [9]South Carolina: As of October 1985. [10]Tennessee: Includes primarily Commodore, IBM, and Radio Shack computers. N/A: Not Available.

Canadian Jurisdictions - Computing in Canadian Education
Unpublished Report - B. C. Ministry of Education - 1986

APPENDIX C

Summary of the Strategic Planning Symposium for Computers in Schools

INTRODUCTION

The initial commercial introduction of fully assembled microcomputers took place in 1977 - just nine years ago. Not long after that, educators began to show interest in using microcomputers in schools. By early 1981, there were approximately 265 microcomputers being used in Alberta schools. In October 1981, the Honourable David King, then Alberta's Minister of Education, announced the creation of a Computer Technology Project. This was the beginning of a coordinated commitment by Alberta Education to facilitate the introduction of microcomputers into Alberta schools. In his 1981 announcement, Mr. King predicted that within three years there would possibly be upwards of 20,000 microcomputers installed in Alberta schools. The forecast of such a large number of microcomputers was viewed as an impossible dream by many educators. How could Alberta schools possibly acquire 20,000 microcomputers in the next five years, when it took almost four years to purchase the initial 265 microcomputers? It would never happen! The critics were correct, instead of three years it took four years to reach King's forecast. Already more than 20,000 microcomputers have been installed in Alberta schools and all indicators point to over 30,000 installed microcomputers by the end of 1986.

Five years ago it was difficult for educators to make any long-range plans for instructional computing because, in general, they lacked experience with, and information about, this rapidly emerging and changing technology. Now, many educators feel they have enough experience with which to attempt to face, and solve, some of the major issues related to educational computing. To this end, a Strategic Planning Symposium which focussed on nine major issues

in educational computing was held in Edmonton, Alberta, January 29 - 31, 1986. The Symposium was initiated and largely funded by the Grande Prairie School District #2357, Alberta Education, Alberta Teachers' Association (ATA), Alberta Teachers' Association Computer Council (ATACC), and the Alberta School Trustees' Association (ASTA). Corporate sponsorship was provided by Apple Canada and IBM Canada. Approximately 160 persons from invited Alberta school jurisdictions, Alberta Education, and Alberta's universities attended the Symposium. Representation included school system personnel (computer consultants, financial personnel, principals, teachers, trustees, and superintendents), officials from Alberta Education, and the deans (or their designates) from the Faculties of Education at Alberta's universities. Guest speakers at the Symposium included David King (Minister of Education), John Hebden (Apple Canada, Toronto), Harvey Long (IBM, Boca Raton, Florida), and David Moursund (University of Oregon).

The Symposium attendees were assigned to one of the following nine working groups:

1. Designing and equipping instructional facilities.
2. Software/Courseware evaluation, development and acquisition.
3. Teacher Development.
4. Instructional networking.
5. Wide-area networking.
6. The integration of computers into the elementary curriculum.
7. The integration of computers into the secondary curriculum.
8. Administrative uses of computers.
9. The use of computers in business education.

Each group consisted of a group leader, up to two expert consultants, and approximately 12 - 15 other attendees. During the assignment of attendees to the working groups, an effort was made to ensure

that no more than one attendee from any school jurisdiction was assigned to any specific working group, and that each working group was composed, where possible, of at least one member from each of the following categories: Alberta Education, computer consultant, teacher, school board financial administrator, school board trustee, and school superintendent.

After two days of deliberations, each working group formulated a number of issues, solutions and recommendations regarding their area of concern. Below is a set of **six major recommendations**, which represents a synopsis of the recommendations of the working groups. For more detailed descriptions, rationale, and recommendations which represent the activities of the individual working groups, the reader is directed to each of the nine chapters which follow.

1. **Planning and Leadership**: That strategic planning be an ongoing process. A suggested approach is the development of a five-year plan, which would need constant monitoring and adjustment due to rapid technological change, increasing experience by educators with educational computing, and the increasingly large base of research findings that is being accumulated. To provide the mechanisms for facilitating accurate planning requires bold, innovative, and decisive leadership by respected educators who are knowledgeable about, and competent in, using educational computing. A group of such leaders should be selected from most of the major stakeholder groups in Alberta schools to assist the Minister of Education in designing, monitoring, and adjusting a long-range plan for educational computing. The Media and Technology Branch should be assigned the responsibility for assembling this group and for implementing the major recommendations of this Planning Symposium.

2. **Funding**: That there be continued support for the acquisition of computers across all segments of Alberta schools. As well, support is required for:

- courseware/software licensing, acquisition, and development
- teacher inservice and preservice and graduate training in educational technology, and
- research into various aspects of instructional and administrative implications of using educational technology.

3. **Communications**: That policies and guidelines be formulated to promote the sharing of information. Because of the rapid changes occurring in educational computing, many projects and evaluations are being conducted, and the number of data-bases is growing rapidly. Much of this information can be electronically accessed. Thus, care must be taken to ensure that all educators and students have **equal access** to a telecommunications system that is both low-cost and easy to use. To encourage sharing of information, emphasis should be given to funding experimentation with, and installation of, local area (classroom and school) network and telecommunication related hardware and software. Also, there is an immediate need for **uniformly low telecommunications rates** for schools throughout Alberta.

4. **Technological Learning Resources**: That the role of the Clearinghouse should be expanded to include more than its function of evaluating a restricted range of courseware/software. There is a need to evaluate emerging technologies to identify those which have potential for application to instruction. In addition, Alberta Education should identify areas within the Alberta Programs of Studies that could be better served by computer-assisted techniques, but which are not currently being addressed by commercial products. Products which need to be developed to fulfil this need could be contracted to the private sector.

5. **Training and Inservice**: Because of the very rapid changes occurring in educational computing, funds and resources must be provided to inservice those teachers already using available computing technology, as well as to furnish introductory inservice to those teachers who have not yet used computers, but who wish to learn how technology could be effectively used in the instructional process.

6. That a **Planning Symposium**, such as this one, be convened every two years to review developments which have occurred since the last Symposium and to modify and reformulate the long-range plans for use of educational computing in the schools.

APPENDIX D
Fifth Annual Conference of the
Alberta Teachers' Association
Computer Council
(ATACC)
Remarks by
Honourable Nancy J. Betkowski
March 14, 1987

Ladies and gentlemen, welcome to the Fifth Annual Conference of the Alberta Teachers' Association Computer Council. If anyone tells me teachers don't work hard, I'll remind them of an 8:00 conference on a Saturday morning.

It is gratifying to see so many teachers here today and to be reminded of the commitment of Alberta teachers to keeping current and providing a high quality of education to our children. I know that in the computer field particularly, teachers have often had to explore new territory on their own, to be pioneers and take risks in their classrooms because the field has been developing so rapidly. Teachers like yourselves have adapted to the changes being brought about by the presence of the new technology in their schools. You have put in those extra hours to learn what the computer is all about and what it can do to help children learn and grow, and you have invested the time and money required to attend this conference to exchange ideas and acquire new knowledge.

Let me tell you a bit about myself; I am not "computer literate" although I do have a sense of what computers can do. But I want to talk to you today about using computers as a tool of learning - as a learning resource - that is the challenge ahead. I congratulate you, the members of ATACC, on your professionalism. I know your job is a high stress one - I hope you feel it is worth it. It is clear that you believe, as I do, that there is no more important function for a society to undertake than the education of its children, and that in carrying out that function one must maintain a constant awareness of the world outside the classroom. We must bring that world into the classroom, and make our curriculum relevant and useful for our students as they prepare to live in the 21st century.

As you know, a number of the ATA specialist councils are celebrating their 25th anniversaries this year. When I spoke to the social studies council at their conference last October, the members were reminiscing about the many ups and downs and various changes that have occurred in social studies teaching between 1961 and 1986. However, I think it is interesting to observe that your council has probably faced as many difficult issues in its five short years of existence as the social studies people have had in their not uneventful 25-year history.

****

Will computers replace teachers? Do we all need to learn how to program a computer? Are computers a passing fad, and will millions of dollars of expensive equipment be relegated to storage rooms? Are computers for job training, or do they have a bigger role to play?

These are questions which have presented themselves to date, and new questions are occurring to us daily.

The rapid changes we are experiencing in our attitudes and ideas about computer education are, of course, related to the rapid changes that we see all around us. A recent issue of Future magazine points out that the total knowledge of mankind is now doubling every seven to eight years, and that over 2,000 new books are being published daily.

The new technology is everywhere - in making decisions, controlling processes, and storing and processing information in stores, banks, offices, schools, and private homes - technology is a part of our lives. The widespread use of advanced technology is changing our lives: we have new ways of communicating, new products, and new methods of production.

Consequently, our children need to learn to live in and respond to a new kind of world, and they need to learn to use a wide range of new tools, tools that have the potential to make their lives both easier and possibly more difficult. They need to learn to make intelligent decisions about the technology that will play such a major role in shaping their futures.

To add to the complexity of this situation, changes to our social structures (such as the education system) tend to occur very slowly. Some people would maintain, in fact, that the basic philosophy of education and its social purpose have not changed in 100 or more years.

In my view, however, the future is what we make of it. In many quarters, the response to current development and to the futurists' predictions seem to be alarm and panic and disorientation, but we have some definite and strong assets in our education system in this province. As I mentioned, we have an experienced, professional and flexible teaching staff who are committed to serving our children's needs. We also have a government that is placing a high priority on education, despite the current economic situation. The Government of Alberta is prepared to demonstrate leadership during these difficult times and to provide clear purpose and direction for our schools.

It is the government's job to assess the information that is available, make decisions, and work with professional educators and school boards to move forward. It is our job to seek opportunities and plan for the future. The government has shown leadership in the area of computer education during the past few years, and I assure you that this leadership will continue.

The Alberta government's policy on secondary education, which I firmly support, is one major example of that leadership. The policy recognizes that technology should be part of the curriculum of the future, and that it can also be a useful tool for helping children learn. As the policy is implemented over the next five to ten years, technology will be playing an increasingly greater role in our schools.

The policy on secondary education calls for the integration of knowledge, skills and attitudes relevant to advances in technology and its utilization into secondary school courses whenever

appropriate. The policy states that secondary education should be characterized by:

- awareness of the advantages and limitations of technological developments.

- awareness of technology's impact upon society.

- use of selected technologies to enhance learning and to prepare students for current and future demands of society.

Along with those policy statements regarding technology, another major initiative of government has been the acquisition of hardware. Since 1981, the province and the school boards have cooperated to make computers available for classroom use, and today, with more than 27,000 computers in schools and a student-computer ratio of 17:1, Alberta is among the top three jurisdictions in North America in this respect. These rather incredible statistics seem even more remarkable when we consider that in January 1981 there were only about 250 computers in Alberta schools. The number has multiplied more than 100 times in six years, and the value of our investment is over $60 million.

So, we have a firm foundation on which to build. We have a policy direction, we have a lot of hardware, and we have enthusiastic teachers. I would like now to speak about the implications of those facts and about the direction I would like technology in education to take in the future.

The subject of "computers in education" is really two subjects:

1. What should be included in the curriculum regarding technology? and

2. How can technology serve as a tool for enhancing the learning process?

Curriculum

I will make only a few comments on the first matter, curriculum. To date, Alberta schools have been offering courses about the computer; that is, computer literacy courses. Although these courses have been helpful in the beginning, when computers were first being introduced to schools, it has become apparent that our needs in this area are now changing. It is becoming apparent that computer literacy should be viewed as a means for integrating the computer into the programs of studies, and not as a curricular end in itself.

As the policy on secondary education has indicated, students need to understand the role and function of technology in our society, including the impact it has on our way of life. We are becoming more aware of how technology can affect every aspect of human endeavour, both negatively and positively. Because of technology's presence, we are experiencing very significant changes, socially, economically, culturally, and scientifically. We have begun to realize that there is considerable scope for the misuse of technology even to the point of destroying the earth itself.

Consequently, technological education is important for all future citizens and not only for students who plan to pursue careers in

technical fields. Technology needs to be addressed in the social studies curriculum, and the language arts curriculum, the science curriculum, and throughout the programs of studies. The use of the computer must be integrated throughout the curriculum. Social studies classes should be addressing the matter I have just been describing - technology as an agent of change in society, and the effects of replacing humans with machines. Those topics should also be part of discussions in science class and part of the study of contemporary literature.

Perhaps one of the most important curricular areas to address is the writing competency of our graduates. The ability to write clearly and correctly is one of the major goals of schooling, and I am convinced that technology has significant potential for supporting this important goal. Therefore, during the next year, Alberta Education will be conducting a major initiative in the area of writing skills development using the word processor. It is our intent that this initiative will contribute significantly to the improvement of students' writing. Components might include a provincial word processing software licensing, student worksheets and teacher guides that are in keeping with the language arts curriculum.

Another curricular consideration that is raised by the secondary education policy is whether technological education should be provided entirely inside the school, or should we be working in cooperation with other community agencies, and drawing upon resources that are available through local business and industry?

As programs of studies are revised, I expect that there will be a considerably greater emphasis on the provision of information about technology and an awareness of its implications for society.

Tools for Enhancing Learning

The second idea, that of computers being used as tools in education, is also full of exciting possibilities, and I will therefore speak about this topic in some detail.

Alberta schools now have 27,000 computers. The next step is to ensure that we use this technology wherever possible to assist in improving students' learning, as it has such great potential for assisting teachers and creating a rich learning environment. The April 1986 report of the National Task Force on Educational Technology (United States Department of Education) sums up these potential uses as follows:

- information technology represents a powerful array of tools that when creatively applied and appropriately integrated will help meet three fundamental goals:
- improving the quality of learning
- increasing the equity of opportunity, access, and quality, and
- ensuring greater cost effectiveness

Thus, although I emphasized earlier how many computers we have in our schools, the goal is not just having computers in our schools, but rather the improvement of learning by any means that is available to us. As you know, to use the hardware that we now have we need two

other essential ingredients: software and teacher expertise. To increase the challenge (and I understand that people who are involved in computer education thrive on challenge), fiscal resources are now very scarce. Therefore, we must reallocate what we have, and be creative, innovative and patient as we strive to make the best use of our current resources.

I believe we must try to ensure that all students have access to the benefits of the computer in the school, in all subject areas and at all grade levels. As I have indicated, students should have opportunities to use the computer as a word processor in language arts and other classes. They should also have opportunities to use spreadsheets and other simulations in science class, and to compose music and design graphics with a computer. Part of this goal can be reached by increasing teacher knowledge, but I recognize that another significant requirement at this time is adequate software.

As you know, Alberta Education has operated a Clearinghouse to evaluate software and provide advice to schools about its suitability for the Alberta curriculum. Also, in the past year the department has conducted an evaluation of application software on a cost performance basis. With 27,000 computers in the province we are a market, and we can therefore negotiate significant discounts. An example of the success of this project is the substantial discount on the price of Appleworks. Based on this success, we will be focussing the energies of the Clearinghouse to address software acquisitions in required areas and beginning the process of provincial site licensing.

I know I am preaching to the converted on my next point, which is preservice and inservice teacher training. Teacher education will be

a major consideration if technology is to be integrated effectively to assist with instruction and enhance the role of the teachers. As the application of technology to teaching and learning increases, teachers may even have to rethink their roles completely. Teachers may find themselves moving away from the direct delivery of information and spending considerably more time on managing and facilitating their students' learning activities.

Alberta Education staff will be working closely with representatives of the three faculties of education, and regularly discussing graduate and preservice educational issues, including computer education.

I am also considering a series of leadership workshops for a few teachers from each school jurisdiction. These teachers could then go back to their communities and share their knowledge with their colleagues. In this way, all areas of the province would have equitable access to new development in the field, and costs would be minimized.

I will make one more specific comment regarding the use of computers as tools to enhance learning. I understand that many schools are now moving to classroom computer networks, in which 30 or more computers are linked together, and sharing disks and printers. I think that such networks have considerable potential for the effective and efficient use of the computers that we now have. Therefore, I am proposing that Alberta Education look into that potential and provide advice to schools on the optimal design and operation of networks.

The government's objective in computer education is to have confident and competent students and teachers, who can understand and use technology as an integral part of their daily learning and teaching experience. In the coming months, Alberta Education will be developing a plan to achieve that objective. The plan may have to be modified at times in light of the current provincial budget deficit and the many demands that are being placed on our scarce resources. But I hope that my comments today have served to assure you that I am supportive of the need to include the computer as an integral part of every school. Further, I am not only aware of the need, but also committed to that goal.

Before I close, I would like to comment on what I consider to be a significant issue relative to computers in education. Yes, computers are powerful and tremendously useful. Yes, computers are a part of our world, like automobiles and TV sets. Yes, computers are transforming our way of life and our teaching methods. But no, computers will not solve all our challenges in education. And no, computers will not replace teachers, although they may support the job of teaching very effectively.

David Suzuki puts it this way:
...There are those who see in the computer a panacea for teachers which opens the possibility to teach children how to think through a series of problem-solving challenges. Nonsense. That is a human activity that demands human guidance and understanding. Nothing will ever replace the flexibility and originality of the human mind. No machine will every duplicate a good teacher.

Nonetheless, with careful planning and wise decision making, computers will help to improve our educational services and better prepare our students for life in a modern, technological world.

Thank you for inviting me to speak to you. I am looking forward to working with you in future months and years, as we continue to improve our use of computers in education and consequently the overall quality of education that is provided to Alberta's youth.

I wish you a very successful and productive conference.